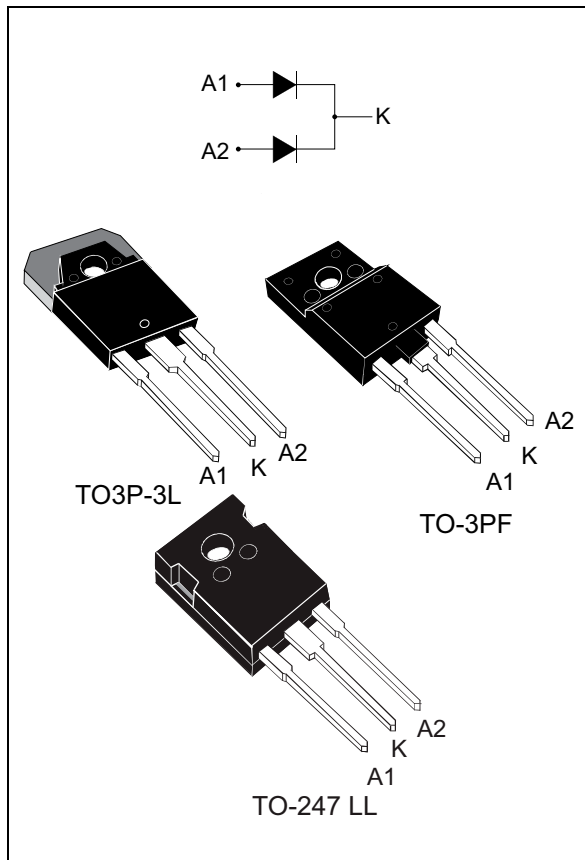


## Turbo 2 ultrafast high voltage rectifier

Datasheet – production data



### Description

The STTH30AC06C uses ST Turbo 2 600 V technology. It is suited as boost diode specially for use in air conditioning equipment as continuous mode interleaved power factor correction.

Table 1. Device summary

| Symbol         | Value   |
|----------------|---------|
| $I_{F(AV)}$    | 2 x 15A |
| $V_{RRM}$      | 600 V   |
| $t_{rr}$ (typ) | 40 ns   |
| $V_F$ (typ)    | 1.15 V  |
| $T_j$          | 175 °C  |

### Features

- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduces switching and conduction losses
- Insulated package TO-3PF:
  - Insulated voltage: 2500 V<sub>DC</sub>

# 1 Characteristics

**Table 2. Absolute ratings (limiting values per diode at 25 °C, unless otherwise specified)**

| Symbol       | Parameter                              |                          | Value       | Unit |
|--------------|--|--------------------------|-------------|------|
| $V_{RRM}$    | Repetitive peak reverse voltage        |                          | 600         | V    |
| $I_{F(RMS)}$ | Forward rms current                    |                          | 30          | A    |
| $I_{F(AV)}$  | Average forward current                | Per diode                | 15          | A    |
|              |  | Per device               | 30          |      |
| $I_{FSM}$    | Surge non repetitive forward current   | $t_p = 10$ ms sinusoidal | 140         | A    |
| $T_{stg}$    | Storage temperature range              |                          | -65 to +175 | °C   |
| $T_j$        | Maximum operating junction temperature |                          | 175         | °C   |

**Table 3. Thermal parameters**

| Symbol        | Parameter                            |           | Value | Unit |
|---------------|--------------------------------------|-----------|-------|------|
| $R_{th(j-c)}$ | Junction to case (TO3P-3L, TO247 LL) | Per diode | 1.5   | °C/W |
|               |                                      | Total     | 0.85  |      |
| $R_{th(c)}$   | Coupling (TO3P-3L, TO247 LL)         |           | 0.2   |      |
| $R_{th(j-c)}$ | Junction to case (TO-3PF)            | Per diode | 3.5   |      |
|               |                                      | Total     | 2.7   |      |
| $R_{th(c)}$   | Coupling (TO-3PF)                    |           | 1.9   |      |

**Table 4. Static electrical characteristics (per diode)**

| Symbol      | Parameter               | Test conditions |                 | Min. | Typ. | Max. | Unit |
|-------------|-------------------------|-----------------|-----------------|------|------|------|------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25$ °C   | $V_R = V_{RRM}$ | -    |      | 10   | µA   |
|             |                         | $T_j = 150$ °C  |                 | -    | 40   | 400  |      |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25$ °C   | $I_F = 15$ A    | -    |      | 1.95 | V    |
|             |                         | $T_j = 150$ °C  |                 | -    | 1.15 | 1.45 |      |
|             |                         | $T_j = 25$ °C   | $I_F = 30$ A    | -    |      | 2.25 |      |
|             |                         | $T_j = 150$ °C  |                 | -    | 1.42 | 1.8  |      |

1. Pulse test:  $t_p = 5$  ms,  $\delta < 2\%$
2. Pulse test:  $t_p = 380$  µs,  $\delta < 2\%$

To evaluate the conduction losses use the following equation:

$$P = 1.1 \times I_{F(AV)} + 0.023 I_{F(RMS)}^2$$

Table 5. Dynamic characteristics (per diode)

| Symbol   | Parameter                | Test conditions                   |   |   | Min. | Typ. | Max. | Unit |
|----------|--------------------------|-----------------------------------|---|---|------|------|------|------|
| $t_{rr}$ | Reverse recovery time    | $T_j = 25\text{ }^\circ\text{C}$  | $I_F = 0.5\text{ A}, I_{rr} = 0.25\text{ A}, I_R = 1\text{ A}$                  | - |      | 30   | ns   |      |
|          |                          |                                   | $I_F = 1\text{ A}, V_R = 30\text{ V}, dI_F/dt = 50\text{ A}/\mu\text{s}$        | - | 40   | 55   |      |      |
| $I_{RM}$ | Reverse recovery current | $T_j = 125\text{ }^\circ\text{C}$ | $I_F = 15\text{ A}, V_R = 400\text{ V}, dI_F/dt = 100\text{ A}/\mu\text{s}$     | - | 4    | 5.5  | A    |      |
| $t_{fr}$ | Forward recovery time    | $T_j = 25\text{ }^\circ\text{C}$  | $I_F = 15\text{ A}, V_{FR} = 1.9\text{ V}, dI_F/dt = +100\text{ A}/\mu\text{s}$ | - |      | 100  | ns   |      |
| $V_{FP}$ | Forward recovery voltage |                                   |   | - | 2.5  |      | V    |      |

Figure 1. Average forward power dissipation versus average forward current (per diode)

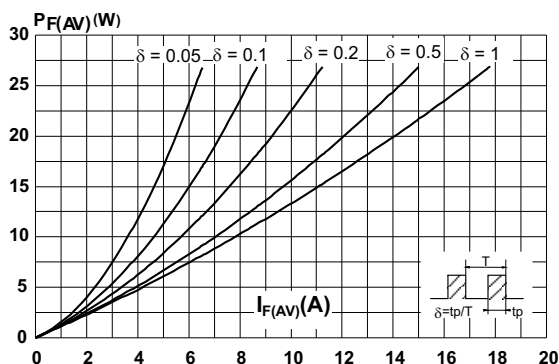


Figure 2. Forward voltage drop versus forward current (typical values, per diode)

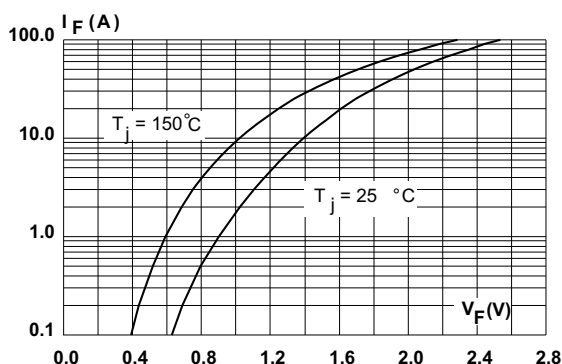


Figure 3. Forward voltage drop versus forward current (maximum values, per diode)

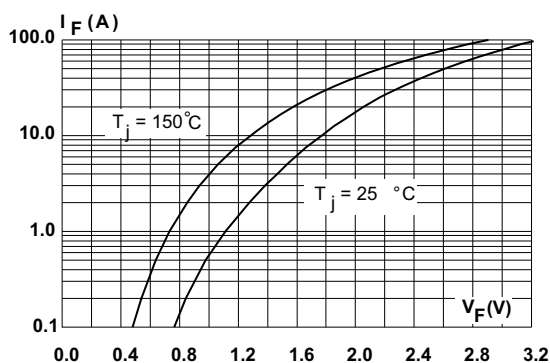
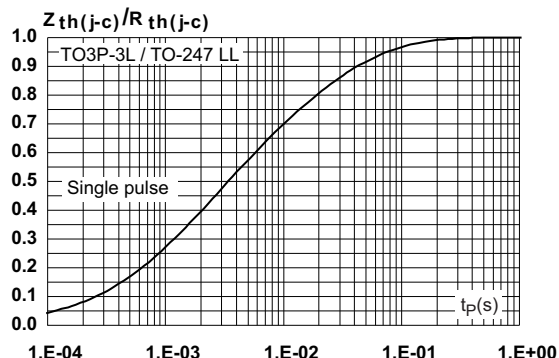
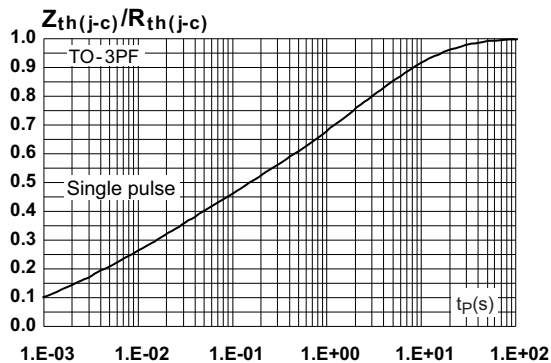


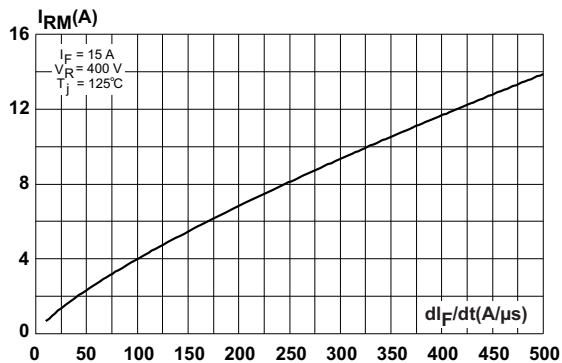
Figure 4. Relative variation of thermal impedance, junction to case, versus pulse duration (TO3P-3L, TO247 LL)



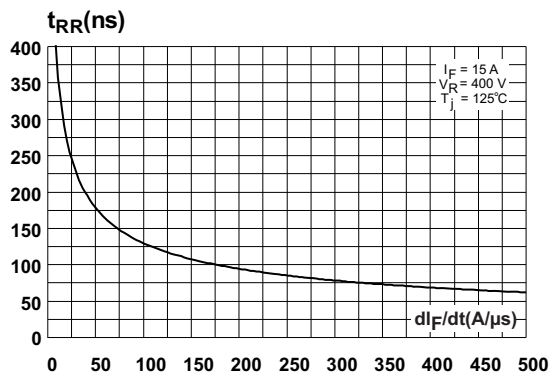
**Figure 5. Relative variation of thermal impedance, junction to case, versus pulse duration (TO-3PF)**



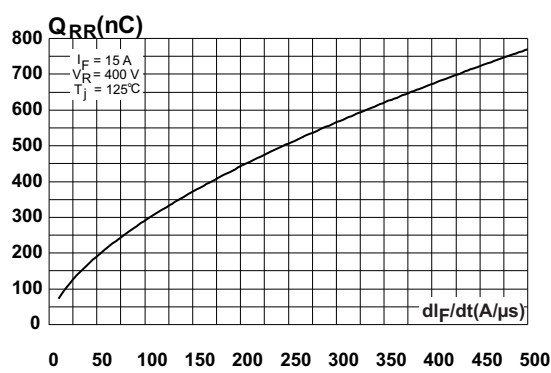
**Figure 6. Peak reverse recovery current versus  $di_F/dt$  (typical values, per diode)**



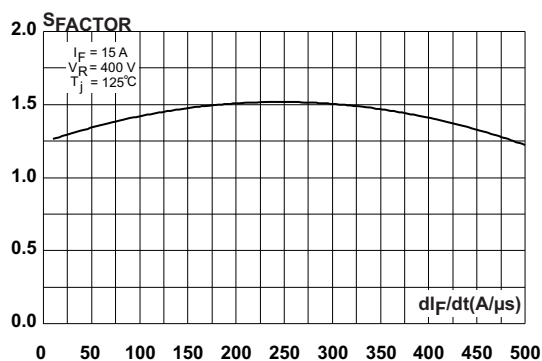
**Figure 7. Reverse recovery time versus  $di_F/dt$  (typical values, per diode)**



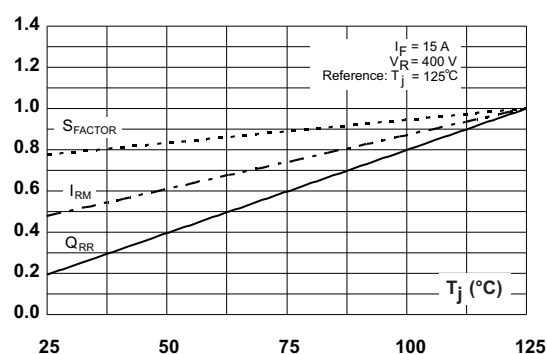
**Figure 8. Reverse recovery charges versus  $di_F/dt$  (typical values, per diode)**



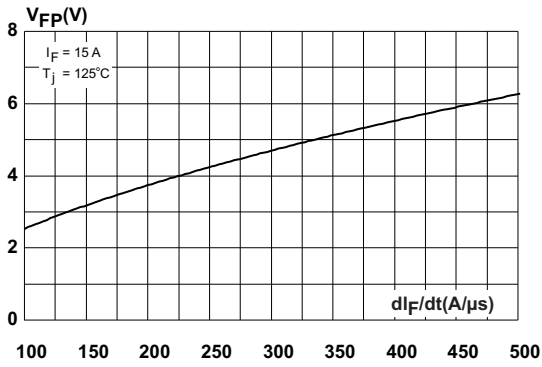
**Figure 9. Reverse recovery softness factor versus  $di_F/dt$  (typical values, per diode)**



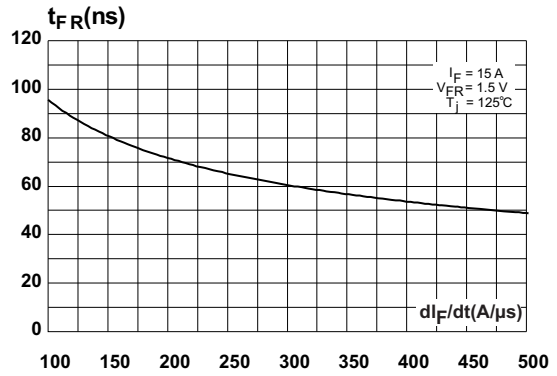
**Figure 10. Relative variations of dynamic parameters versus junction temperature**



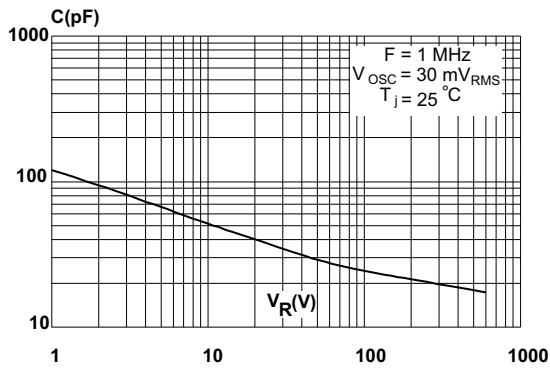
**Figure 11. Transient peak forward voltage versus  $di_F/dt$  (typical values, per diode)**



**Figure 12. Forward recovery time versus  $di_F/dt$  (typical values, per diode)**



**Figure 13. Junction capacitance versus reverse voltage applied (typical values, per diode)**



## 2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque (TO-3PF): 0.4 to 0.6 N·m
- Maximum torque value (TO-247 LL): 1.0 N·m

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### 2.1 TO3P-3L package information

Figure 14. TO3P-3L package outline

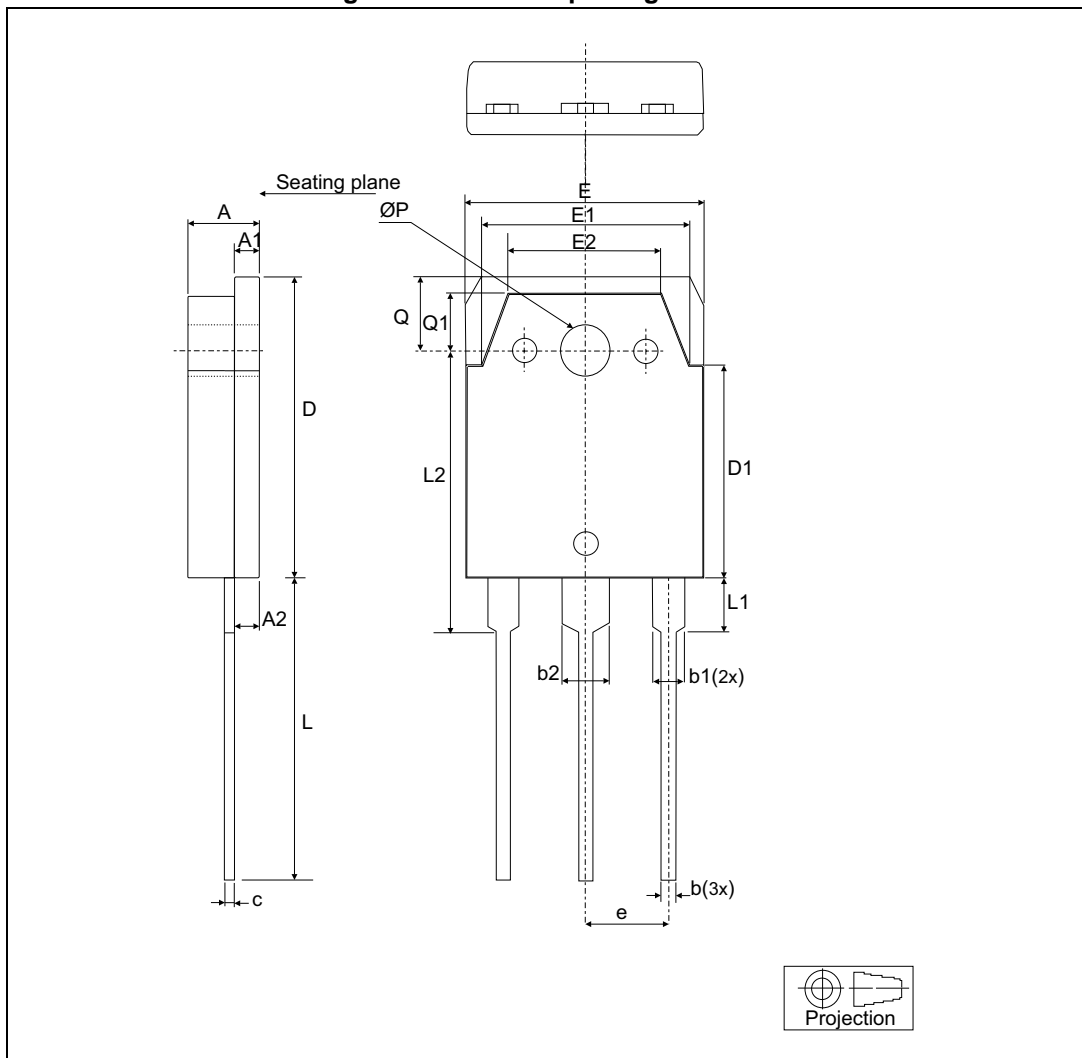


Table 6. TO3P-3L package mechanical data

| Ref. | Dimensions  |       |       |        |      |      |
|------|-------------|-------|-------|--------|------|------|
|      | Millimeters |       |       | Inches |      |      |
|      | Min.        | Typ.  | Max.  | Min.   | Typ. | Max. |
| A    | 4.6         |       | 5     | 0.18   |      | 0.19 |
| A1   | 1.45        | 1.5   | 1.65  | 0.05   | 0.06 | 0.06 |
| A2   | 1.20        | 1.40  | 1.60  | 0.04   | 0.05 | 0.06 |
| b    | 0.80        | 1     | 1.20  | 0.03   | 0.04 | 0.05 |
| b1   | 1.80        |       | 2.20  | 0.07   |      | 0.08 |
| b2   | 2.80        |       | 3.20  | 0.11   |      | 0.12 |
| c    | 0.55        | 0.60  | 0.75  | 0.02   | 0.02 | 0.03 |
| D    | 19.70       | 19.90 | 20.10 | 0.77   | 0.78 | 0.79 |
| D1   |             | 13.90 |       |        | 0.54 |      |
| E    | 15.40       |       | 15.80 | 0.60   |      | 0.62 |
| E1   |             | 13.60 |       |        | 0.53 |      |
| E2   |             | 9.60  |       |        | 0.38 |      |
| e    | 5.15        | 5.45  | 5.75  | 0.20   | 0.21 | 0.22 |
| L    | 19.50       | 20    | 20.50 | 0.76   | 0.78 | 0.80 |
| L1   |             | 3.50  |       |        | 0.14 |      |
| L2   | 18.20       | 18.40 | 18.60 | 0.71   | 0.72 | 0.73 |
| ØP   | 3.10        |       | 3.30  | 0.12   |      | 0.13 |
| Q    |             | 5     |       |        | 0.19 |      |
| Q1   |             | 3.80  |       |        | 0.15 |      |

## 2.2 TO-3PF package information

Figure 15. TO-3PF package outline

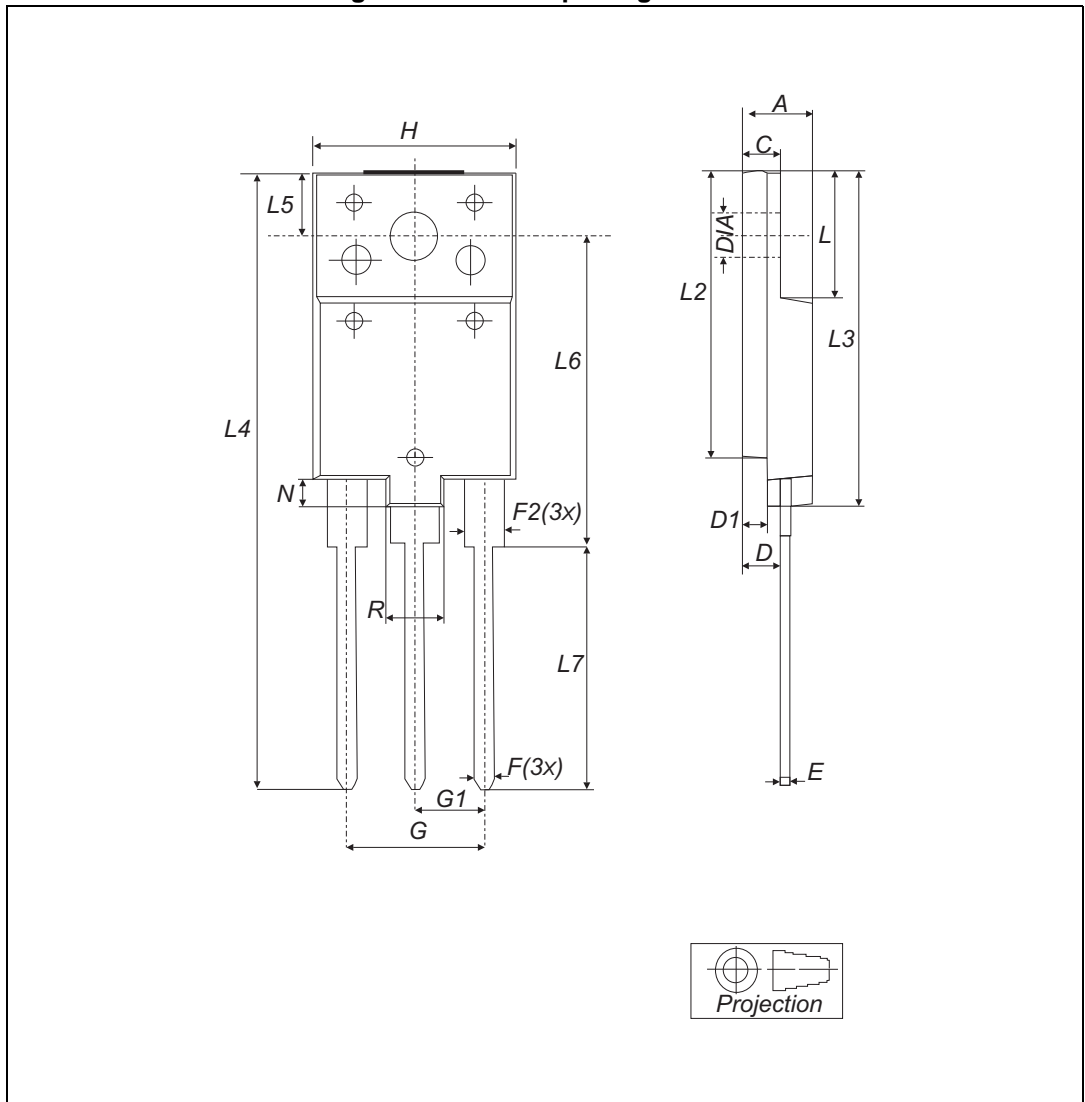




Table 7. TO-3PF mechanical data

| Ref. | Dimensions  |      |       |        |      |       |
|------|-------------|------|-------|--------|------|-------|
|      | Millimeters |      |       | Inches |      |       |
|      | Min.        | Typ. | Max.  | Min.   | Typ. | Max.  |
| A    | 5.30        |      | 5.70  | 0.2    |      | 0.22  |
| C    | 2.80        |      | 3.20  | 0.11   |      | 0.12  |
| D    | 3.10        |      | 3.50  | 0.12   |      | 0.13  |
| D1   | 1.80        |      | 2.20  | 0.07   |      | 0.08  |
| E    | 0.80        |      | 1.10  | 0.03   |      | 0.04  |
| F    | 0.65        |      | 0.95  | 0.025  |      | 0.037 |
| F2   | 1.80        |      | 2.20  | 0.07   |      | 0.08  |
| G    | 10.30       |      | 11.50 | 0.40   |      | 0.45  |
| G1   |             | 5.45 |       |        | 0.21 |       |
| H    | 15.30       |      | 15.70 | 0.60   |      | 0.61  |
| L    | 9.80        | 10   | 10.20 | 0.38   | 0.39 | 0.40  |
| L2   | 22.80       |      | 23.20 | 0.89   |      | 0.91  |
| L3   | 26.30       |      | 26.70 | 1.03   |      | 1.05  |
| L4   | 43.20       |      | 44.40 | 1.70   |      | 1.74  |
| L5   | 4.30        |      | 4.70  | 0.16   |      | 1.18  |
| L6   | 24.30       |      | 24.70 | 0.95   |      | 0.97  |
| L7   | 14.60       |      | 15    | 0.57   |      | 0.59  |
| N    | 1.80        |      | 2.20  | 0.07   |      | 0.08  |
| R    | 3.80        |      | 4.20  | 0.14   |      | 0.16  |
| Dia  | 3.40        |      | 3.80  | 0.13   |      | 0.15  |

### 2.3 TO-247 LL package information

Figure 16. TO-247 LL package outline

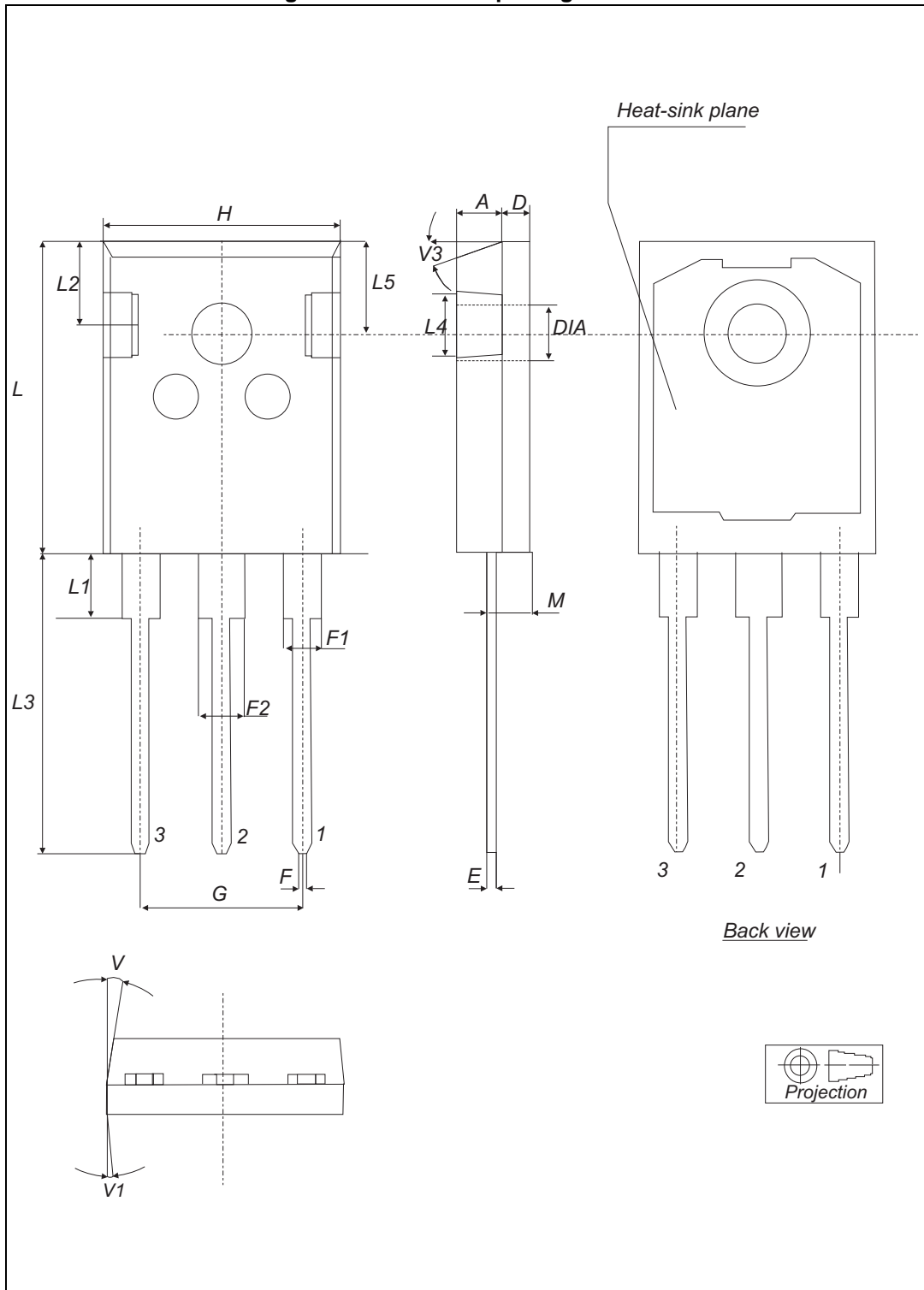


Table 8. TO-247 LL mechanical data

| Ref. | Dimensions  |      |       |           |     |       |
|------|-------------|------|-------|-----------|-----|-------|
|      | Millimeters |      |       | Inches    |     |       |
|      | Min.        | Typ. | Max.  | Min.      | Typ | Max.  |
| A    | 4.90        |      | 5.15  | 0.192     |     | 0.202 |
| D    | 1.85        |      | 2.10  | 0.072     |     | 0.082 |
| E    | 0.55        |      | 0.67  | 0.021     |     | 0.026 |
| F    | 1.07        |      | 1.32  | 0.042     |     | 0.051 |
| F1   | 1.90        |      | 2.38  | 0.074     |     | 0.093 |
| F2   | 2.87        |      | 3.38  | 0.11      |     | 0.133 |
| G    | 10.90 BSC   |      |       | 0.429 BSC |     |       |
| H    | 15.77       |      | 16.02 | 0.62      |     | 0.63  |
| L    | 20.82       |      | 21.07 | 0.81      |     | 0.82  |
| L1   | 4.16        |      | 4.47  | 0.163     |     | 0.175 |
| L2   | 5.49        |      | 5.74  | 0.216     |     | 0.225 |
| L3   | 20.05       |      | 20.30 | 0.789     |     | 0.799 |
| L4   | 3.68        |      | 3.93  | 0.144     |     | 0.154 |
| L5   | 6.04        |      | 6.29  | 0.237     |     | 0.247 |
| M    | 2.25        |      | 2.55  | 0.088     |     | 0.10  |
| V    |             | 10°  |       |           | 10° |       |
| V1   |             | 3°   |       |           | 3°  |       |
| V3   |             | 20°  |       |           | 20° |       |
| ∅    | 3.55        |      | 3.66  | 0.139     |     | 0.143 |

### 3 Ordering information

**Table 9. Ordering information**

| Order code    | Marking       | Package   | Weight | Base qty. | Delivery mode |
|---------------|---------------|-----------|--------|-----------|---------------|
| STTH30AC06CP  | STTH30AC06CP  | TO3P-3L   | 5.26   | 30        | Tube          |
| STTH30AC06CPF | TH30AC06C     | TO-3PF    | 5.6    | 30        | Tube          |
| STTH30AC06CWL | STTH30AC06CWL | TO-247 LL | 4.36   | 30        | Tube          |

### 4 Revision history

**Table 10. Document revision history**

| Date        | Revision | Changes   |
|-------------|----------|---|
| 13-Nov-2013 | 1        | First release.  |
| 25-Jun-2015 | 2        | Update of cover page and <a href="#">Table 7</a> .<br>Format updated to current standard. |
| 01-Jul-2015 | 3        | Updated <a href="#">Features</a> .  |

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